

## CLAIMS

We claim:

1. An electrokinetic pump, comprising:

5 a fluid flow channel disposed on a substrate, wherein said fluid flow channel is provided with fluid inlet and outlet means in fluid communication with said flow channel, and wherein said fluid flow channel is comprised of patterned microchannels;

10 an electrolyte contained within said fluid flow channel and in fluid communication with the patterned microchannels;

spaced electrodes disposed at either end of said fluid flow channel and in contact with said electrolyte; and

means for applying an electric potential to said spaced electrodes.

15 2. The electrokinetic pump of claim 1, wherein the patterned microchannels are comprised of a plurality of parallel juxtaposed microchannels.

3. The electrokinetic pump of claim 2, wherein the microchannels are about 200 nm deep.

4. The electrokinetic pump of claim 2, wherein the microchannels are about 100  $\mu\text{m}$  wide.

20 5. The electrokinetic pump of claim 2, wherein the microchannels are spaced about 50  $\mu\text{m}$  apart.

6. The electrokinetic pump of claim 1, wherein said electrolyte is an aqueous electrolyte solution.

7. The electrokinetic pump of claim 1, wherein said electrolyte is a pure

organic liquid.

8. The electrokinetic pump of claim 7, wherein the pure organic liquid is selected from the group consisting of acetonitrile, methyl alcohol, ethyl alcohol and toluene.

5 9. The electrokinetic of claim 1, wherein the electrolyte is a mixture of an aqueous electrolyte solution and a pure organic liquid.

10. The electrokinetic pump of claim 1, wherein said spaced electrodes are embedded unitary electrodes.

10 11. The electrokinetic pump of claim 1, where the walls of the patterned microchannels are coated with a coating to enhance the density of surface charge and thereby improve electroosmotic flow or to manipulate the sign of the surface charge to control the direction of electroosmotic flow.